Certificate

I, ELIZABETH FLINT, residing at 2, CLEVELAND PLACE, EXMOUTH, DEVON, EX8 1BL, GB

hereby declare

that I am familiar with the German and English languages and am a professional translator.

That I have prepared a translation of Application PCT/.EP2004/009767, filed September, 2nd, 2004 and entitled „Selbstsperrender Gurtaufroller", said translation thereof being attached thereto and made part of this declaration.

To the best of my knowledge and belief, the above-mentioned translation is accurate and fairly reflects the contents and meaning of the original document.

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on 23 January 2006

Elizabeth Flint

(Name of Translator)

Self-locking belt roller

Description

The invention relates to a self-locking belt roller with a vehicle-sensitive and/or belt strap sensitive actuatable blocking device for the belt shaft, with a profile head as carrier of a locking member for locking of the belt shaft which is arranged so as to be movable in relation to the housing and with a force limiting device in the form of a torsion bar which is connected at its one end with the belt shaft so as to be torque proof and at its other end with the profile head so as to be torque proof.

A belt roller with the above characteristics is described in DE 196 81 341 C1. In so far as it is necessary to couple the belt shaft and the profile head during normal winding up and out and also during normal belt blocking, two shear pins are arranged on the side of the belt shaft which faces the profile head, which engage with corresponding borings in the profile head and which are riveted to the profile head during assembly, so that belt shaft and profile head are held together as one assembly during further assembly processes. If a correspondingly great tensile force is exercised on the belt in the direction in which the belt is

pulled out following blocking of the belt shaft instigated by the belt/strap/sensitive or vehicle/sensitive control system, for example because of a vehicle occupant falling into the belt during an accident, the shear pins break off, and the belt shaft can afterwards be rotated relative to the blocked profile head in the direction in which the belt is pulled out. This relative rotation is taken up by the torsion bar which comes into play between the belt shaft and profile head, which achieves the desired force limitation based on the form-changing work of the torsion bar.

The known belt roller is associated with the disadvantage that manufacture of the shear pin connection is costly and time-intensive, because the shear pins which engage in the recesses of the profile head are riveted to the profile head, whereby correspondingly high demands are placed on the precision of the connection and its fit. The force peak which occurs as a result of the shearing off of the shear pins immediately before the force limitation takes effect is difficult to define or to set, and finally, following shearing off of the shear pins, axial forces can no longer be transferred, whereby the torsion bar elongates in axial direction when subject to torque due to plastic deformation and drives belt shaft and profile head apart in axial direction, which is not desirable and disadvantageous.

The invention is therefore based on the task of improving the connection between belt shaft and profile head in a self-locking belt roller of the type described at the beginning of this document with regard to its manufacture and function.

The solution to this task, including advantageous forms and further developments of the invention, results from the content of the patent claims which follow this description.

The basic concept on which the invention is based provides that at least one projection which is located on one of the components connected with one another and which projects in axial direction engages in at least one recess provided in the front side of the other component and that a clamping ring is located in the annular space formed between the projection and the inner walls of the recess and clamps between the projection and the inner walls of the recess.

The advantage is associated with the invention that during assembly of belt shaft and profile head into the desired subassembly, it is only necessary to put belt shaft, clamping ring and profile head together, whereby clamping of belt shaft and profile head takes place by means of the putting together process and the axial force which can then be transferred is greater than the joining force which has to be applied during assembly. Connection of belt shaft and profile head basically already takes place above the torsion bar. However, provision of the clamping ring also means that the force peak which occurs because of coupling of belt shaft and profile head using shear pins as described in the state of the art no longer takes place and the force limiting system reacts more softly, whereby it may occur that an additional force limiting level is also created by means of the clamping ring in the course of force limitation. A further advantage of the invention consists in the fact that the connection by means of the clamping ring also transfers axial forces during force limitation, so that any elongation of the torsion bar no longer has the disadvantageous consequences described above.

According to an embodiment of the invention, it is intended that the clamping ring can be pushed onto the projection and that the external diameter of the clamping ring is larger than the internal diameter of the recess.

In order to make assembly simpler, according to one embodiment of the invention it can be provided that the protection is provided on its front side with a step for accommodation of the clamping ring. This means that on the one hand the clamping ring is pre-fixed on the projection of the profile head, so that the subassembly which has been pre-assembled to this extent is more easily handled during final assembly of the belt roller, and on the other hand the clamping ring cannot escape while the clamping ring is being pushed into the allocated recess, but remains fixed as regards its position.

Alternatively it can be provided that the clamping ring can be laid into the recess and that the internal diameter of the clamping ring is smaller than the diameter of the projection.

In so far as one embodiment of the invention provides that the clamping ring is in the form of a flat disc, further embodiments can provide for the clamping ring being in the form of a closed ring or alternatively as an open ring exhibiting a gap.

According to one embodiment of the invention, it is also useful to form the clamping ring as a spiral, as this spiral form has the advantage that based on the relative rotation of belt shaft and profile head during the force limitation, the clamping ring can create a return force in the same

way as a thread and works contrary to the axial displacement of the belt shaft in relation to the profile head which has already been discussed.

Embodiments of the invention are shown in the drawings, which are described below.

The drawings are as follows:

Fig. 1. A subassembly consisting of belt shaft and profile head as a component of a self-locking belt roller in an overall view,

Fig. 2 A partial schematic view of the components during the joining process,

Fig. 3 The object of Figure 2 during axial loading,

Fig. 3a The object of Figure 2 or Figure 3 in a different embodiment before joining,

Fig. 4 An individual view of a clamping ring,

Fig. 5 The clamping ring according to Figure 4 in a different embodiment,

Fig. 6 The object of Figure 2 with a clamping ring subject to further variation.

In so far as the object of the invention is a self-locking belt roller, an overall view of the object can be found in DE 196 81 341 C1, on which

the generic description of the object of the invention is based. As only the subassembly consisting of belt shaft and profile head is necessary for understanding of the present invention, in Fig. 1 the belt shaft is designated with 10 and a profile head to be coupled to the belt shaft is designated with 11. Belt shaft 10 and profile head 11 are coupled by means of a torsion bar 12, whereby torsion bar 12 is linked in torque proof manner with belt shaft 10 with its left end shown in Figure 1 and with its right end shown in Figure 1 is connected in torque proof manner with profile head 11, for which purpose profile head 11 exhibits an accommodation opening 22 which is formed to as to correspond to the end of torsion bar 12. Profile head 11 extends with an axial projection 14 starting from the profile head and forming accommodation opening 22 into a recess 20 (Fig. 2). Joining of belt shaft 10 and profile head 11 occurs by adding a clamping ring 16, which will be explained further below.

Fixing of projection 14 of profile head 11 in allocated recess 20 of belt shaft 10 is shown in Figures 2,3 and 6. This is achieved by inserting a clamping ring 16 into the annular space formed between projection 14 and inner walls 21 of recess 20. In Figures 2 and 3 there is only a schematic representation of how clamping ring 16 behaves during assembly in the insertion direction (Arrow 25), and how when pulled in the opposite direction (Arrow 26), clamping ring 16 positions itself and clamps between projection 14 and inner walls 21 of recess 20 and prevents projection 14 of profile head 11 from slipping out of recess 20 of belt shaft 10. Such loading in the pull direction (Arrow 26) can for example occur during handling of the subassembly consisting of belt shaft 10 and profile head 11 during further assembly steps of the belt roller or also during the force limitation. In Figure 3a, an embodiment is

shown in which projection 14 of profile head 11 is additionally provided with a step 30 on the front side, onto which clamping ring 16 is placed. This means that clamping ring 16 is fixed in advance to projection 14 for final assembly of the belt roller.

As can be seen from Figures 4 and 5, the clamping ring can be designed as a closed clamping ring 16 in the form of a flat disc or - again as a flat disc - as an open clamping ring 17 which exhibits a gap 18.

As can finally be seen from Figure 6, a clamping ring 19 in a further embodiment can exhibit a spiral form, so that during the relative movement of belt shaft 10 and profile head 11 which occurs during force limitation, the clamping ring creates return force in axial direction in the same way as a thread.

Instead of the form described in the embodiment, alternatively a step could be formed on the front side of the belt shaft 10 which engages in a corresponding ring-shaped recess of profile head 11.

The characteristics of the object of these documents which are described in the above description, the patent claims, the summary and the drawing can be of fundamental significance for the realisation of the invention in its various embodiments both individually and in any desired combinations with each other.